PATENT ABSTRACTS OF JAPAN

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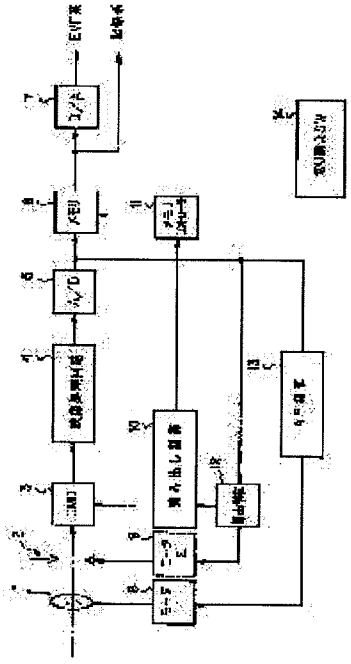
(54) CAMERA



(57)Abstract:

PURPOSE: To execute control at high speed by converting video data supplied by means of a second rate into a first rate to output the data.

CONSTITUTION: A subject image is image-formed on CMD as an image pickup element through a photographing lens 1 and a diaphragm 2, and it is converted into an electric signal. An image pickup processing circuit 4 executes a prescribed image pickup processing to an output signal from CMD 3, and outputs a video signal. The video signal is converted into digital video data by an A/D converter 5 and it is stored in a memory 6 as one field data, for example. In such a case, for the image pickup element which can be driven at high speed, the setting operation of a photographing condition is performed by a second rate different from a first rate being fit for recording or projecting an image. Image

data supplied by the second rate are converted into the first rate to output it. Thus, high speed control can be executed.

CLAIMS

[Claim(s)]
[Claim 1]A camera comprising:
The 1st rate that is suitable for record thru/or projecting, etc. of a picture about a rate which ****s in frequency which takes out information for expressing a picture from an image sensor is a driving means which can drive this image sensor by the 2nd different rate.
A control means which performs setting-operation of a photographing condition based on image data supplied by the 2nd rate of the above, and a rate conversion device for changing into the 1st rate of the above image data supplied by the 2nd rate of the above, and outputting it.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]Especially this invention relates to the camera which performs various control of AF control etc. at high speed about a camera.

[0002]

[Description of the Prior Art]In the camera which has an electronic imaging means of a video camera etc., control of various kinds, such as automatic focus (AF) control and automatic exposure (AE) control and automatic white balance (AWB) control, is performed. For example, in the AF control for moving a taking lens to a focusing position. Detection of a focusing position is performed based on the position from which the contrast of a screen serves as the maximum using the high-frequency component of the video signal obtained from an image sensor, drive controlling of the taking lens is carried out, and auto-focusing (AF) control is performed so that maximum contrast may be obtained. This control is usually called mountain-climbing AF or video AF control. This kind of AF control uses that the change in the contrast component of a video signal corresponds to the focusing state of a taking lens.

[0003]The move direction of a lens required to result in a focusing state based on change of the contrast for every predetermined field of the video signal obtained when changing a lens to one way and specifically changing a focusing state (trial) is presumed, A lens is moved in the direction in which a contrast component increases, and focusing is performed. Also about control of others, such as AE control of a camera, and AWB control, although this differs, they is the same at the point that it is control based on a video signal. [of an algorithm of operation]

[0004]

[Problem(s) to be Solved by the Invention]As mentioned above, in various control of the conventional camera, it is carried out paying attention to the information included in the video signal obtained from an image sensor, or its change. And the criterion data (for example, contrast component data) used for this control is obtained in each field unit. For example, the minimum unit of a sampling of the contrast component which shows a focus condition is the 1 field in the video signal rate of the camera concerned substantially. Therefore, focusing control action speed will be restricted at this video signal rate. For example, when making an NTSC video camera perform typical mountain-climbing focusing operation, supposing 30 sampled contrast component

data is required, By the time the AF operation which moves a lens to a focusing position is completed, the time of the 30 field (0.5 second) is needed, and high-speed control is impossible.

[0005]Since the taking lens was moved finely forward and backward and contrast information has been acquired at the time of the direction judgment at the time of the initial motion of the above-mentioned AF control, and the check of maximum contrast, the image displayed on a monitor system will turn into an unsightly image on which it ****ed out of the focus.

[0006]Then, the purpose of this invention does not have restriction by the video signal rate of a camera, performs various control actions, such as AF control operation, at high speed, and there is in providing the camera with which a stable image is acquired.

[0007]

[Means for Solving the Problem]In order to solve the above-mentioned technical problem, a camera by this invention, With the 2nd rate that is different from the 1st rate suitable for record thru/or projecting, etc. of a picture about a rate which ****s in frequency which takes out information for expressing a picture from an image sensor, a driving means which can drive this image sensor, It has a control means which performs setting-operation of a photographing condition based on image data supplied by the 2nd rate of the above, and a rate conversion device for changing into the 1st rate of the above image data supplied by the 2nd rate of the above, and outputting it, and is constituted. It can also have a selecting means which chooses image data of one for record thru/or projecting, etc. among image data supplied within 1 field period. [two or more]

[0008]

[Function]While the 2nd different rate from the 1st rate that is suitable for record thru/or projecting, etc. of a picture in this invention in the image sensor in which a high speed drive is possible performs setting-operation of a photographing condition, High-speed control is enabled by changing into the 1st rate the image data supplied by this 2nd rate, and outputting it.

[0009]

[Example]Next, it explains, referring to drawings for the example of this invention. Drawing 1 is a basic constitution figure of the camera by this invention. It extracts as the taking lens 1, and via 2, image formation of the object image is carried out to CMD(ChargeModulation Device)3 as an image sensor, and it is changed into an electrical signal. To the output signal from CMD3, the image pick-up processing circuit 4 performs predetermined image pick-up processing, and outputs a video signal. This

video signal is changed into digital image data by A/D converter 5, and is memorized by the memory 6, for example as 1 field data.

[0010]Structure is [the above CMD] similar with the MOSFET.

POLY-Si of a doughnut shape and sauce are formed by n+ diffusion zone of the inside, and, as for the drain, the gate is formed by outside n+ diffusion zone.

Thus, since the gate is surrounded by the drain and 1 pixel comprises a 1CMD element formed with that electric and an optical isolation region is unnecessary and one transistor, it is suitable for multi-pixel-izing and densification.

[0011]When make sauce into the earth side, make a drain into positive bias, a substrate is set as negative bias in light-receiving operation of this CMD, a gate is made into negative bias and it irradiates with light, an optical generation electron hole is Si-SiO2 under a gate electrode. It is accumulated in an interface as an inversion layer electrode. The potential barrier between the sauce to an electron and a drain falls by this electron hole accumulation, and the source current according to incident light quantity flows, and is outputted outside as signal current. Thus, since the above CMD does not carry out the direct output of the optical generation electric charge, it will be provided with the analog memory function in the pixel. Concrete operation of this CMD is explained by Japanese Patent Application No. No. 153607 [five to] in full detail.

[0012]The reading control part 10 controls the memory controller 11 which controls writing/read-out of the memory 6 while controlling the read timing of CMD3. The picture image data read from the memory 6 is outputted to a recording system, and is changed into an analog signal by D/A converter 7, and is outputted to an EVF system or a monitor system. On the other hand, since the picture image data from A/D converter 5 makes AE control and AF control perform, it is supplied to the exposure controller 12 and the AF control part 13. The exposure controller 12 drives the reading control part 10, and controls the read-out rate of CMD3 while it drives and extracts the motor 9 and controls 2 based on this picture image data that exposure should be set as an optimum state. The AF control part 13 drives the motor 8 based on AF information (contrast component) acquired from the above-mentioned picture image data, and makes the taking lens 1 move to a focusing position.

[0013]In this example, it was read from the memory 6, and by driving CMD3 which is an image sensor at a different drive rate, the output rate of the signal outputted to a recording system or a monitor system acquired information required for AF control etc. conventionally at high speed, and has solved the conventional problem. As an image sensor, what is necessary is just an element in which not only the above CMD

but a high speed drive is possible, and CCD, MOS, etc. can be used.

[0014]The timing chart of this example of operation is shown in drawing 2. Falling of Vertical Synchronizing signal VD of periodic TV is answered, exposure arithmetic processing is performed, and the reset pulse to CMD3 is outputted after that. Reset of CMD3 is performed in the period TR and reset is performed one by one from the upper part of a screen. Two or more these reset pulses are supplied in 1 vertical synchronizing pulse cycle independently of a video signal rate, and a read signal is supplied to CMD3 corresponding to this reset pulse. A read-out period is prescribed by TY and read-out is performed one by one from the upper part of a screen simultaneously with reset. From immediately after reset of CMD3, since exposure is started, time TE from the standup of a reset pulse to the standup of a read signal is equivalent to exposure time, and lens driving processing for AF processing is performed based on the read signal.

[0015]The flow chart of the operation processing procedure of this example is shown in drawing 3. After acquiring exposure (AE) information from the picture information first obtained after the processing start when falling of Vertical Synchronizing signal VD was waited for and (Step S101) preceded (Step S102), it asks for exposure by an operation (Step S103). This exposure arithmetic is an operation which asks for the exposure times (getting it blocked number of times of read-out) I in an IRIS value, exposure time TE, and 1 field. It is being referred to as I= 3 in this example (refer to drawing 2). As for operation, since two exposure or more is possible if it is 1/2 or less exposure time of time TV, but it may become underexposure with the surrounding luminosity or a relation with shutter speed in the usual AE operation, it is preferred to enable it to choose suitably.

[0016]Then, as shown in drawing 2, an IRIS value and the exposure times I are controlled (Step S104), it waits for falling of the next VD (Step S105), and the parameter J which counts exposure times is initialized to "1" (Step S106). Next, after waiting for set-up exposure time TE to pass (Step S107) and performing AF control operation, it is judged whether the parameter J became equal to I (Step S109). If it is not J=I, only 1 will ********** J (Step S110) and it will return to processing of Step S107 again. In Step S109, if judged as J=I, the outputted image selection process described below will be performed (Step S111), and it will return to processing of Step S101.

[0017]The outputted image selection process of Step S111 is explained referring to the flow chart of drawing 4 for the example of I= 3. Since it is I= 3, as AF information (contrast component) acquired from picture image data, Since three pieces (the AF

information 1, the AF information 2, and AF information 3) are obtained, set each AF information to a, b, and c (Step S201), and AF information which has the maximum among the AF information a, the AF information b, and the AF information c is chosen, The picture from which the AF information concerned was acquired is chosen as an outputted image, and is outputted. Therefore, first, compare the AF information a with the AF information b (Step S202), and the AF information a when larger than the AF information b, The AF information a is compared with the AF information c (Step S203), and since the AF information a is judged that the AF information a is the maximum when larger than the AF information c, the outputted image in which the AF information a was acquired is chosen (Step S207).

[0018]In Step S202, if the AF information a is judged not to be larger than the AF information b, If the AF information b is compared with the AF information c (Step S204) and the AF information b is judged to be larger than the AF information c, since the AF information b is judged to be the maximum, the picture from which the AF information b was acquired will be chosen as an outputted image.

[0019]In Step S203, since the AF information a is judged that the AF information c is the maximum in Step S204 if the AF information b is judged not to be larger than the AF information c more greatly than the AF information c, the picture from which the AF information c was acquired is chosen as an outputted image.

[0020]The selection operation of the above-mentioned outputted image is explained with reference to drawing 5. Drawing 5 (A) shows the relation between a lens position and a contrast value, and the lens position where a contrast value serves as the maximum is equivalent to a focusing position. First, the figure A section is operation at the time of trial, as shown in the figure (B), it moves a lens with the position 1->2->3, and AF information is acquired in each position. 1-3 in the figure (C) and (D) show each lens position of a lens movement order similarly. In the case of the figure (A), since the value in the position 3 is the maximum, as for a contrast value, the picture acquired in the position 3 is chosen as an outputted image.

[0021]Next, in the B section of the figure (A), although a lens is moved to one way with the position 1->2->3, since the contrast value acquired in the position 3 is the maximum, the picture acquired in the position 3 is chosen also in this case. In order that the C section of the figure (A) may search for a maximum position in this case as shown in the figure (D) although a contrast value is the characteristic in the neighborhood used as the maximum, it will go and come back to a lens position with 1->2->3. And since the contrast value in the position 1 is the maximum, the picture acquired in the position 1 is chosen.

[0022]Thus, since the selected output only of the picture from which a maximum contrast value is obtained is carried out, the picture which is not in the focusing state in the other position and which faded is not outputted, and an image does not become unsightly.

[0023]By the way, when photoing the photographic subject under movement of a golf swing etc., and movement, it is desirable to output the picture acquired at equal intervals in time, but at the above-mentioned example, the picture chosen is not necessarily the same interval. Therefore, in such a case, a user can also set up operation so that an isochronous interval picture may be acquired. That is, as for the selection method of such an outputted image, it is desirable to be carried out pertinent according to a case. This viewpoint to the camera "which has two above-mentioned operations or further different operational mode, and formed the switch (14 in drawing 1) which chooses it" is one of the suitable modifications.

[0024]In the above-mentioned example, the exposure controller can also control the drive rate and exposure time of an image sensor according to the luminosity (or output level obtained from an image sensor) of a photographic subject. By carrying out like this, where S/N is secured according to the luminosity of a photographic subject, the possible highest is got blocked, and the optimal sampling rate can be set up now. Since it has a rate conversion device which changes the output signal from an image sensor into a signal output rate, various algorithms which had restriction by directions for use from a viewpoint of the image quality deterioration of an outputted image can be applied conventionally, with a good outputted image maintained.

[0025]When adding just to make sure, in the above-mentioned example, took up AF, but. It is completely arbitrary design items for what kind of control the information acquired in this invention is used, and if it is a person skilled in the art to demonstrate a high effect even if it applies AF, AE, and AWB quoted at the beginning to image recognition, image processing, etc. from the first, I will be understood easily.

[0026]

[Effect of the Invention]as explained above, since various control information is acquired according to the camera by this invention, without receiving restriction by the video signal rate of the camera concerned, as compared with the former, it is markedly alike, and high-speed control actions (AF control operation etc.) become possible.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a basic constitution figure of one example of the camera by this invention.

[Drawing 2]It is a teaming chart of the example of this invention of operation.

[Drawing 3]It is a flow chart which shows the operation processing procedure of the example of this invention.

[Drawing 4]It is a flow chart which shows the outputted image selection process procedure in the flow chart of drawing 3.

[Drawing 5]It is a figure for explaining the selection operation of the outputted image shown in drawing 4.

[Description of Notations]

1 Taking lens Two Diaphragm

3 CMD 4 Image pick-up processing circuit

5 A/D converter Six Memory

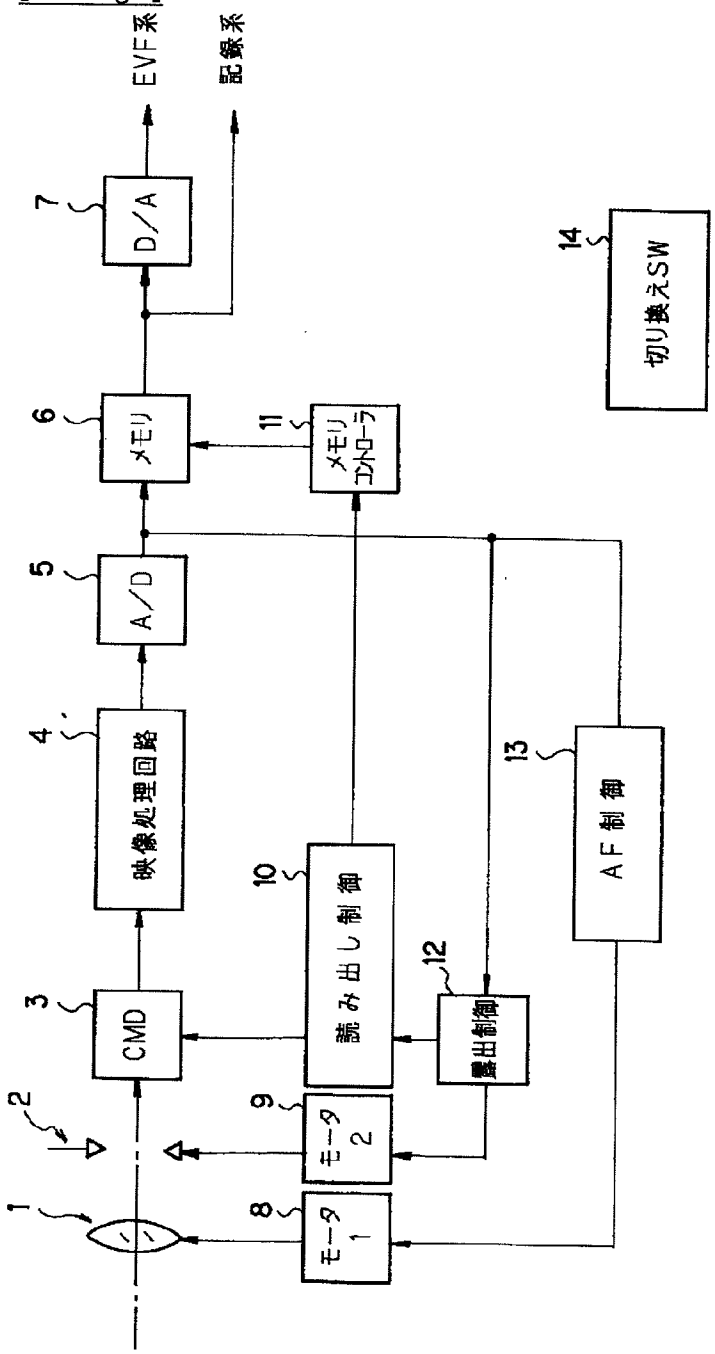
7 D/A converter 8 and 9 Motor

10 Reading control part 11 Memory controller

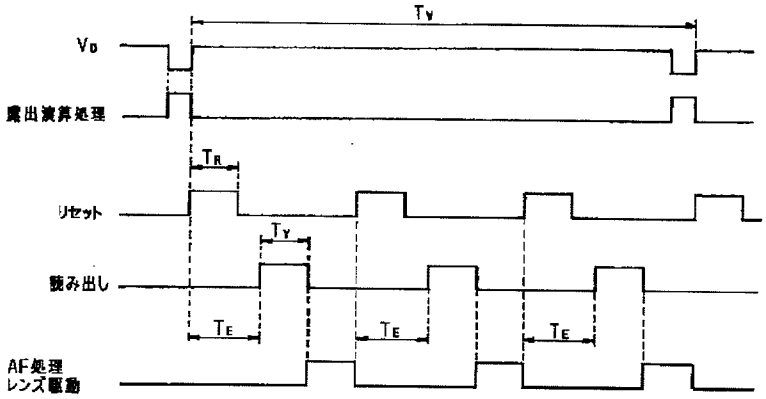
12 Exposure controller 13 AF control parts

DRAWINGS

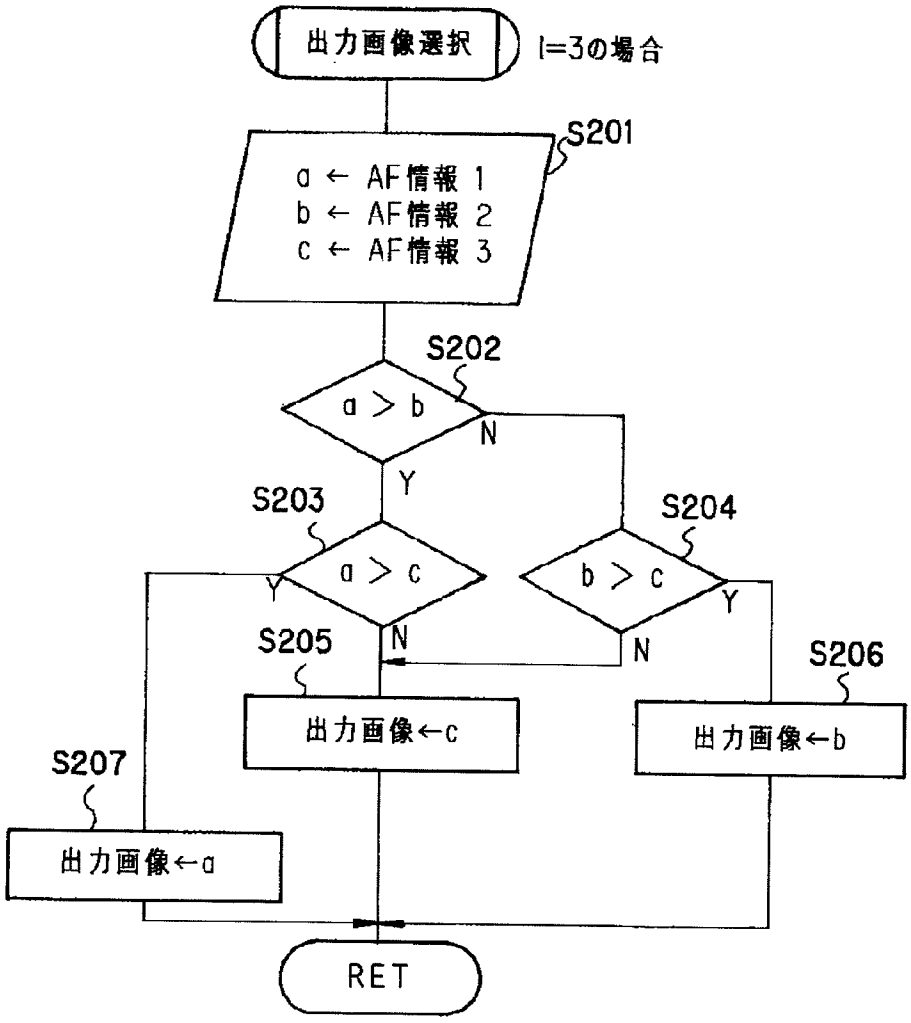
[Drawing 1]



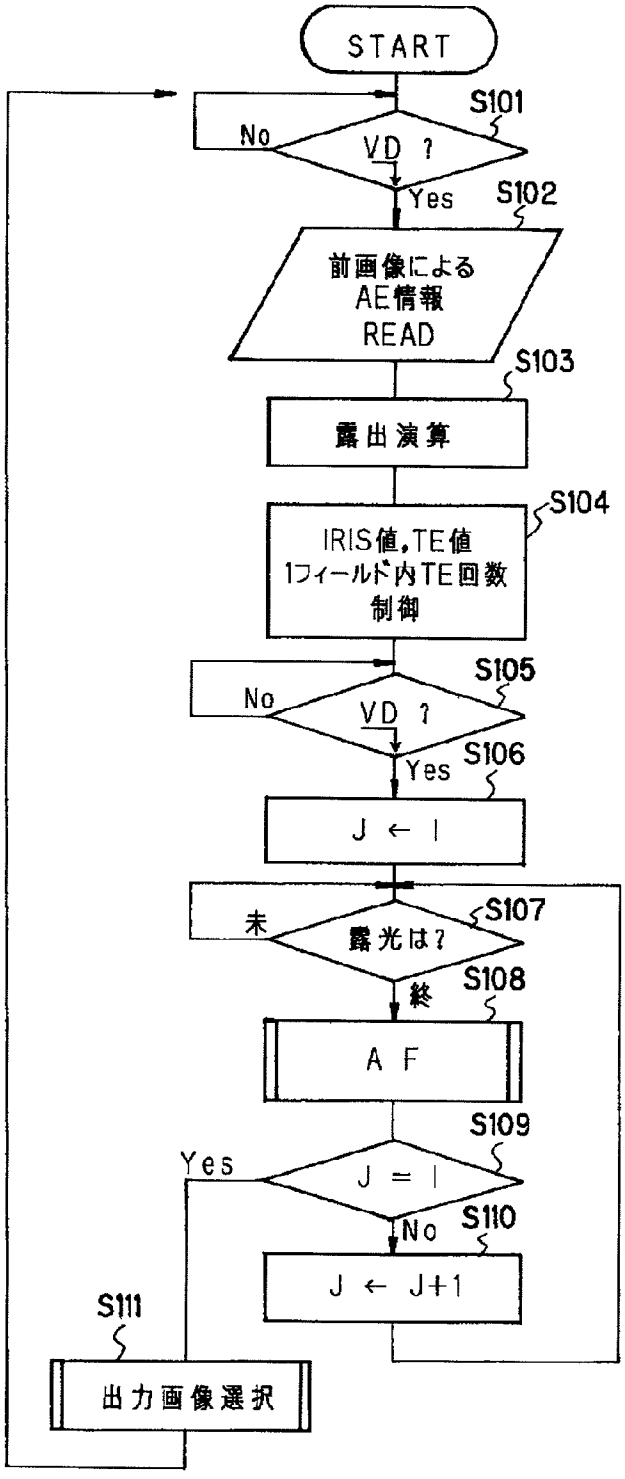
[Drawing 2]



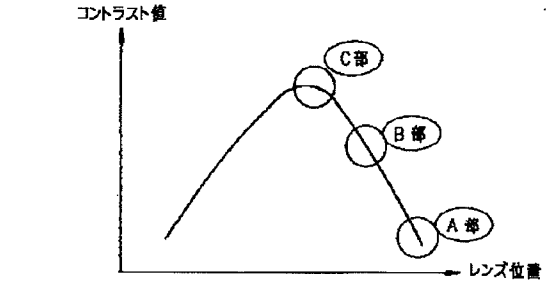
[Drawing 4]



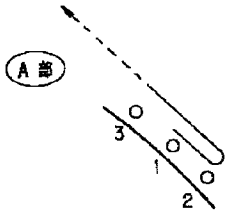
[Drawing 3]


START
S101
No
VD ?
Yes
S102
前画像による
AE情報
READ
S103
露出演算
S104
IRIS値,TE値
1フィールド内TE回数
制御
S105
No
VD ?
Yes
S106
J ← 1
S107
未
露光は?
終
S108
A F
S109
Yes
J = 1
No
S110
J ← J+1
S111
出力画像選択

[Drawing 5]



(A)



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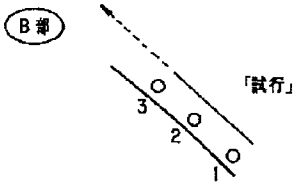
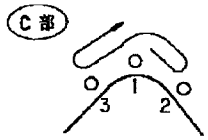


(C)



(D)